PB90-160201

Waste Reduction Assistance Program (WRAP) On-Site Consultation Audit Report: Printing Company

Alaska Health Project, Anchorage

Prepared for:

Environmental Protection Agency, Seattle, WA

17 Mar 87

U.S. Department of Commerce
National Technical Information Service
NTIS

PB90-160201

Alaska Health Project

WASTE REDUCTION ASSISTANCE PROGRAM (WRAP)

ON-SITE CONSULTATION AUDIT REPORT:

PRINTING COMPANY

ALASKA HEALTH PROJECT
431 W. 7TH, SUITE 101
ANCHORAGE, AK 99501

MARCH 17, 1987

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U.S. DEPARTMENT OF COMMERCE
NATIONAL TECHNICAL INFORMATION SERVICE
SPRINGFIELD, VA. 22161

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. 002-006 A	2.	3. Recipient's Accession No. PB 90 160201/AS
4. Title and Subtitle: Waste Reduction Assistance Program (WRAP) On-Site Consultation Audit Report: Printing Company			5. Report Date: March 17, 1987
7. Author(s)			6.
			8. Performing Organization Rept. No.
9. Performing Organization Name and Address: Alaska Health Project, 431 W. 7th, Suite 101, Anchorage, AK 99501			10. Project/Task/Work Unit No.
			11. Contract(C) or Grant(G) No. (C) (G)
12. Sponsoring Organization Name and Address: U.S. Environmental Protection Agency, Region 10, 1200 Sixth Avenue, Seattle, Washington 98101			13. Type of Report & Period Covered: environmental audit
			14.

15. Supplementary Notes

This document is included in the Pollution Prevention Information Clearinghouse, (operated by Science Applications International Corporation for the U.S. EPA), 8400 Westpark Drive, McLean, Virginia 22102.

16. Abstract (Limit: 200 words)

This study reports on one printing company. The study makes recommendations for the reduction of hazardous waste for this shop and for others in the industry, including advice on choosing raw materials, segregating wastes, decreasing the amount of hazardous materials used, using silver recovery units, providing training programs to workers, and developing inventory control.

17. Document Analysis a. Descriptors

pollution prevention, source reduction, recovery

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report)	21. No. of Pages
Release unlimited		27
	20. Security Class (This Page)	22. Price

(See ANSI-Z39.18)

See Instructions on Reverse

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

READERS NOTE:

The information contained herein is intended to be general guidance for the facility described in this report and the industry as a whole. It is the product of approximately 6 to 8 hours of on-site consultation. The focus of the report is waste management and waste reduction, not regulatory compliance. Regulatory issues mentioned herein are discussed only insofar as they impinge on management issues related to hazardous waste management and waste reduction, and are not part of a comprehensive discussion about all pertinent regulation requirements. Waste determinations were made from available data, no on-site sampling took place. Managers interested in specific information on hazardous waste regulations should contact the nearest EPA or Department of Environmental Conservation office. Waste reduction measures are described briefly and should be further evaluated and balanced against unique conditions of each specific business.

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I. Introduction

A. The Waste Reduction Assistance Program (WRAP).

In 1986, the United States Environmental Protection Agency (US EPA) awarded a RCRA 8001 grant to the Alaska Health Project, a private non-profit organization located in Anchorage, Alaska. The grant was awarded to develop and deliver a pilot project to assist Alaska's Small Quantity Generators (SGQs) in complying with new Small Quantity Generator regulations. The project, the Waste Reduction Assistance Program (WRAP) has two principal goals:

1) To conduct outreach and education activities to support EPA's Small Business Initiative to achieve Small Quantity Generator compliance with new hazardous waste regulations.

2) To conduct on-site audits to investigate hazardous waste management practices and processes for specific SQG's categories.

WRAP on-site consultation audits are conducted with the understanding that the identity of selected SQGs remain confidential and that all audit reports contain no specific facility identifiers. Audit results and recommendations are intended to be widely applicable to other SQGs in Alaska. Audit reports are available to interested parties upon request.

This report is the product of conducting an environmental audit of an Alaskan printer. The report goals are to:

1) Analyze the hazardous wastes of a typical print shop in Alaska and publish the findings in a report.

2) Provide a format, by making available this report, to other printers and businesses to conduct their own environmental audit.

3) Identify the hazardous wastes produced in the printing industry and the processes by which they are generated.

4) Make recommendations, if appropriate, to reduce the amount of hazardous wastes generated.

5) Identify common waste management practices and advise on possible better methods to store and ship hazardous wastes.

6) Analyze the cost benefits of the waste reduction methods recommended in this report.

All recommendations, information, and cost data are subject to change. They will not reflect future market conditions, regulatory climate, and changes in plant processes. This report

offers only general guidance to other small quantity generators and all the information provided should be balanced against the unique conditions of each specific business.

B. Audit Methods.

The audit team consisted of an environmental scientist and an environmental health specialist. In addition, the audit was reviewed by a professor of Environmental Engineering and a Certified Public Accountant. The audit comprised two main steps:

1) Interview and data collection.
2) Plant walkthrough.

Step one consisted of an interview with the plant manager. The interview was designed to collect the following information:

1) General plant information (size, operation, etc.).

2) Plant processes.

3) Material safety data sheets.

4) Current waste management practices.

The interview was also designed to provide the plant manager with a detailed description of the audit process.

In step two, the audit team and the plant manager conducted a visual inspection of the plant operations and processes. The audit team identified the processes generating potential hazardous wastes and investigated current waste management practices.

The approximately 8 hours of on-site consultation included no environmental sampling or industrial hygiene monitoring. All the information provided in this report is based on the interview, the walkthrough, and a review of the current and available literature. Hazardous waste determinations were based upon a review of material safety and data sheets, any existing laboratory reports, and EPA literature. Waste volume figures are based upon estimates made by the generator and the audit team during the plant walkthrough.

II. Plant & Printing Processes Description

The printing plant described in this report is considered of moderate to large size by Alaskan standards. The plant has a surface area of 12,000 square feet and it employs a staff of approximately 40. The employees are composed of journeymen, clerical support, sales, and management. The processes performed in the plant are:

1) Typesetting/Photoprocessing

2) Platemaking

3) Lithography/Offset Printing

4) Silk Screening

5) Form Printing

These processes are widely used in the printing processes. It should be noted, however, that not all Alaskan printing shops are equipped to perform all the processes listed above.

Photoprocessing involves taking the picture of the material to be printed and the developing of that picture. Platemaking is the process by which the picture of the material to be printed is transferred to a printing plate. The plates are used in the printing process itself. The aluminum plates are composed of a water repelling area, the image area, and of a waterphilic area, the non-image area. Ink is applied to the image area and a mixture of water and alcohol is applied to the non-image area. The inked image area is then transferred to the substrate (paper).

Silk screening is a process by which ink is squeezed through a metallic, nylon, or silk mesh onto the substrate. The screen is composed of porous and non-porous areas. The ink passes through the porous areas of the screen and is transferred to the paper or other substrates.

All the chemicals used by the plant are stored on the premises. Usually the chemicals needed for a particular printing process are kept at the point of operation (See Figure II.1 for plant diagram). There is no central storage of chemicals. The plant warehouse contains solely substrates.

The printing process, as a rule, starts in the Preparation room. Copy setting, type setting, and paste-up take place in the Preparation room. Once the job is in its desired form, or camera ready, it is taken to the Camera room. A picture of the job is taken and the negative produced is stripped. The stripping process imprints the positive image of the job onto a metal plate or onto a silk screen. The metal plate is used in offset printing, the silk screen is used in silk screen printing. The printing of forms involves the use of the printing presses and rubber plates. The rubber plates are made in-house.

The paper is brought from the plant warehouse as needed. The finished product is allowed to dry on the plant premises. Once dried, the product is packaged and either delivered or picked up by the customer.

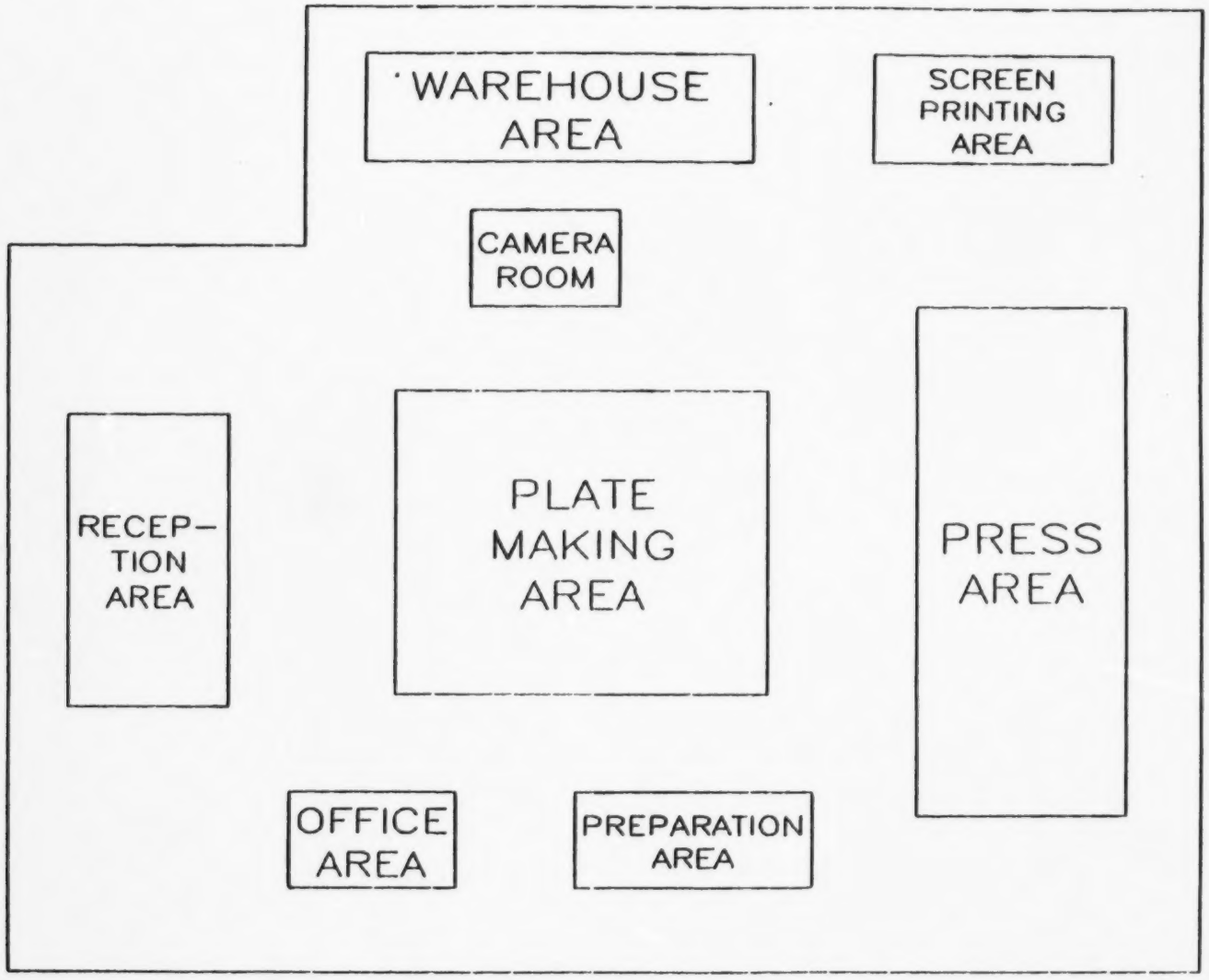

FIGURE II.1 PLANT DIAGRAM

III. Waste Generation

A. Waste Generation by Process.

The wastes produced by each printing process are described in this section. Table III.1 shows the type and quantity of wastes generated by various printing operations. The type and the quantity of the wastes generated were determined from an interview with the printer, available Material Safety and Data Sheets (MSDS), and literature. No sampling was performed.

Type Setting

Photographic developer and fixer are used in the type setting process. Type setting generates an average of 5 gallons each per month of waste fixer and developer. The 10 gallons per month of photographic wastes also contain an activator. The activator is added to the fixer during the developing process.

Camera Room

The camera room also makes use of a photographic developer and a fixer. Five gallons per month of developer are added to the developer bath. Developer losses occur through absorption by the photographic paper and by transfer to the fixer bath. The developer bath is changed every other year and produces 20 gallons of wastes. Five gallons of fixer and 10 gallons of replenisher are added to the fixer bath every month to keep the solution active. The fixer bath is not changed and therefore does not generate any waste. The fixer is lost through photographic paper absorption.

The camera room also makes use of a brominating agent to keep rubber plates, used in the printing of forms, supple. The one pound brominating cartridge is replaced once a year.

Plate Making

The making of the printing plates, used for offset printing, utilizes a developer. A replenisher is added to the developer when needed. The plate developing process generates four gallons per month of waste developer and replenisher combined. The plate developing process also generates, as wastes, 2.5 gallons per month of a mixture of water and subtractive finisher. The aluminum plates are sold for recycling after printing.

Printing & Press Maintenance

The presses are cleaned with a cleaning solution and a cleaning solvent. The color wash and the cleaning solvent are used to clean the ink off the rubber press rollers. The mixture of cleaning solvents and inks, forms a sludge that is collected in an open 5 gallon plastic bucket. Five gallons per month of sludge are produced by cleaning the presses. Rags are used to wipe the rollers and excess ink. The rags are sent to a commer-

cial cleaner. Ink skins are also produced. The ink skins are produced by the upper layer of the ink drying in the can. Seven pounds of ink skins are produced per month. A mixture of water, etch, and alcohol is also used in the printing process. Two ounces of etch and 0.2 gallon of alcohol are added to a gallon of water. This water mixture is used to wet the waterphilic area of the printing plates. Six gallons per day of this mixture are discarded as waste.

Table III.1
Types of Potential Hazardous Wastes Generated

Process	Waste Type	Quantity
Type Setting	Developer, Fixer Silver, Activator	10 gallons/month
Camera Room	Developer	0.85 gallon/month
Plate Developing	Developer, Replenisher	4 gallons/month
	Subtractive Finisher	2.5 gallons/month
Printing	Inks skins	7 pounds/month
	Wastewater with etch, gum arabic, alcohol	120 gallons/month
	Brominating cartridge	1 pound/year
Press Cleaning	Ink and solvents as ink sludge	5 gallons/month
Silk Screen Preparation	Stencil remover paste, Screen filler, Screen soap, Emulsion, wastewater	200 gallons/month

Screen Printing

Screen printing produces no waste ink. Left-over ink is kept and used again. The process generates some waste paper tainted with inks. The paper is not considered a hazardous waste and can be disposed of in the trash. Acetone is used to clean the screens. No acetone wastes are produced. Virtually all of the acetone used is lost through evaporation. Screen cleaning and preparation for a new emulsion requires the following:

1) Stencil remover paste (1/2 gallon per month)
2) Screen filler (1/2 gallon per month)
3) Screen soap (1/2 gallon per month)
4) Emulsion (1 gallon per month)

An average of two gallons of water is used to clean a silk screen. The printer processes around one hundred screens per month and uses 200 gallons per month of water to wash them.

B. Regulated Wastes

Table III.2 gives a classification of the wastes produced by the printing shop. The developer baths and the fixer baths, in accordance with Local, State, and Federal regulations, can be disposed of in the sewer if their hazardous materials concentrations do not exceed certain limits. Presently the photographic baths may exceed the silver concentration limits set by the Anchorage Municipal Code, Title 26.50. The municipal code sets a concentration limit of 0.02 mg of silver per liter of wastewater. The municipal limitations, however, apply to the total discharge from a user, exclusive of sanitary wastewater. The wastewater from the print shop, taking into account the etch water and the wash water, may not have concentrations of silver exceeding 0.02 mg/l. To insure compliance with the municipal ordinance, the print shop's wastewater should be periodically tested for heavy metals and other regulated wastes.

Table III.2
Classification of the Printer's Wastes

Waste Type	Chemical Name	Classification /Shipping Name
Photographic Wastes.	Various photographic wastes, non-corrosive, without heavy metals.	Not regulated
Waste Ink w/solvents	Aliphatic and aromatic solvents, ink with or without heavy metals	Waste ink
Screen Printing Wash Water	Various photographic wastes, non-corrosive, without heavy metals	Not regulated
Brominating Cartridge	Trimethylbenzylammonium	Not listed as a hazardous waste - should be tested

The properties of the wastes listed in Table III.2 were established from the information furnished the Material Safety Data Sheets for the chemicals used at the plant. The property of the wastes will of course vary with the chemicals used. Consult appendix C for a more general description of the wastes produced by the printing industry.

IV. Waste Management

A. Waste Storage

A small quantity generator may not store hazardous wastes in quantities greater than 13,200 pounds for longer than 180 days. In Alaska, because there are no treatment, storage, or disposal facilities within 200 miles, the wastes can be stored for up to 270 days. Generators of less than 220 pounds per month of hazardous wastes are subject to the small quantity generator regulations if they store more than 2,200 lbs of hazardous wastes.

Hazardous wastes containers should be clearly labeled "hazardous wastes". The containers should also be marked with the date the collection of hazardous wastes began. The containers should be kept in good condition, closed, and inspected once per week. The wastes, if ignitable or reactive, should be placed as far as possible from the storage's property line. The wastes may be treated on-site without a permit if:

a) They are treated within 180 days. In Alaska 270 days.

b) The containers conform to the regulation described in the above paragraph.

c) Steps are taken to prepare for and prevent accidents as described in the Small Quantity Generator Regulations.

Precautions should be taken to prevent accidents involving the hazardous materials stored on site. The regulations for the storage of the hazardous were written to prevent accidental spills, fires, explosions, and release to the environment. The operator of a site should also develop a contingency plan to deal with an accident involving the hazardous wastes being stored.

B. Waste Disposal Methods

Photographic Wastes

The photographic wastes can be disposed of in the sewer if they satisfy the limitations set by the Local, State, and Federal regulations. The wastes inspected, at this printer, satisfied those requirements. It is important to stress that the nature of photographic wastes can greatly vary with the type of photographic chemicals used. There is a large variety of developers and fixers available with different chemical compositions. Photographic wastes, for instance, can easily contain sufficient heavy metals concentrations to prohibit their discharge to the sewer system.

Regulated photographic wastes must be disposed of in accordance with the EPA's and the Department of Transportation's (DOT) regulations. See appendix C for shipping name, hazard class, and UN/NA Identification number.

Waste Inks

The printer generates waste ink mixed with solvents when cleaning the presses. This ink sludge is categorized as a hazardous waste and cannot be disposed of as a solid waste.

The printer also generates ink skins. The top layer of the ink dries in the can and forms skins that must be discarded.

This printer generates less than 220 pounds of hazardous wastes per month and by law is considered to be a conditionally exempt small quantity generator. EPA's regulations stipulate that conditionally exempt generators dispose of their hazardous wastes in a hazardous waste facility, a landfill, or other facility approved by the State for industrial or municipal wastes. In Alaska, however, there are no facilities that will accept hazardous wastes. The waste ink sludge and the ink skins, therefore, must be shipped out-of-State to an EPA approved facility. The ink must be shipped in containers as prescribed by DOT, according to flash point, pressure, or viscosity. A hazardous waste hauler, with an EPA identification number, should be able to offer assistance in choosing adequate packaging. The packaging requirements are described in the DOT regulations (49 CFR Part 172).

C. Costs

The cost of disposing of hazardous wastes can vary with the following factors:

1) Quantity and nature of the wastes.

2) Transportation distance.

3) Variations in prices charged by the haulers and disposal facilities for the transportation and disposal of the hazardous wastes.

It may be advantageous to contact other generators of hazardous wastes to coordinate shipments and realize savings through bulk shipments. Waste determination fees may be eliminated if future waste streams remain constant.

In Alaska, there are no EPA approved hazardous wastes management facilities. All hazardous wastes, as defined by RCRA, must be shipped out-of-State to an approved facility. The printer in this audit has never shipped hazardous wastes and therefore did not have information on actual disposal costs for printing wastes.

Comprehensive disposal costs for a 55-gallon drum of hazardous wastes generated in Alaska can cost up to $1,390 (Glean Incorporated). See Table IV.1 for a cost breakdown.

The high disposal cost of hazardous wastes should be taken

into consideration when purchasing raw materials and planning pital expenditures. Production processes and methods should also be analyzed to identify means of minimizing the generation of hazardous wastes and thereby disposal costs.

Table IV.1
Hazardous Waste Disposal Cost Estimate for One 55-Gallon Drum Generated in Alaska

Waste Determination (In State Lab Analysis)	$ 175.00
Transportation	310.00
Disposal Site Profile (On site Lab Analysis)	200.00
Waste Acceptance	125.00
Incineration	580.00
Total	$ 1,390.00

V. Waste Generation Reduction Alternatives.

A. Incentives

A number of incentives exist to promote hazardous wastes reduction in the private sector. Waste reduction incentives include:

1) High Disposal Costs: Land Disposal restrictions outlined in the Hazardous and Solid Waste Amendments of 1984 limit the number of untreated wastes that can be disposed of on land, and impose stricter standards on surface impoundments and underground tanks. In addition, hazardous wastes management facilities are scarce in the United States. These and other factors contribute to the high disposal costs of hazardous wastes.

2) Financial Liability: Generators of hazardous wastes incur liability of their wastes from the time they are produced and their ultimate disposal. This is known as the "cradle to grave" concept. The liability includes potential improper handling by the waste transporter and disposal facility. Generators also are liable for any future sudden releases of disposed wastes. The generator may be required to pay for the entire clean-up of a spill and/or waste site. Generating a smaller quantity of hazardous wastes translates into decreased financial liability.

3) Public Relations: Employing waste reduction techniques in a business can improve the public perception of the business. A favorable perception can result in better community relations and possible financial gains.

B. Waste Reduction Categories

Waste reduction techniques can be grouped into the following broad categories:

1) Process Technologies: This involves the use of technology to reduce process wastes. Silver recovery units and aqueous plate making, for instance, are waste reduction technologies used successfully by the printing industry.

2) Plant Operations: This category involves alterations in plant operations to decrease hazardous wastes generation. Better inventory control and efficient use of raw materials are examples of plant operations changes that can be made to minimize hazardous wastes production.

3) Plant Input Changes: Another way to reduce hazardous wastes generation is to utilize raw materials that will

not become hazardous wastes during the production process. Use of water based inks, for instance, instead of inks with solvents will reduce hazardous waste generation.

4) In-Process Recycling: This process recycles potential hazardous wastes by channeling them back into the production process. Replenishing photographic chemicals as an alternative to disposal is an example of recycling.

C. Potential Waste Reductions in the Printing Industry

Most printing processes can generate hazardous wastes. The waste reduction techniques described in the previous section can be applied to the printing industry. The printer in this audit could benefit from these techniques as follows:

Process Technologies

Platemaking processes that do not generate hazardous wastes are available on the market. The printer in this audit could convert the present plate processor to an aqueous processor at a cost of $1500. The conversion is necessary because the pumps in the current processor are of an older type and would cause the aqueous chemistry to foam. The foaming interferes with the process. Magnetic pumps are needed for the aqueous process. More recent plate processors, with magnetic pumps, can readily use aqueous chemistry without any conversions. The aqueous chemistry sold by Image Control Systems, Inc. in Anchorage, costs around 6-7% more than conventional plate making chemistry. Reductions in waste disposal costs may make the purchase of aqueous chemistry advantageous.

New complete aqueous plate processors are comparable in cost with conventional systems. Image Control Systems, Inc. sells new plate processors with a price range of $10,000-$13,000. An aqueous system should be considered when capital renovations are planned. Potential reductions in hazardous waste disposal costs and the resulting decreased liability are factors that should be taken into account when making a purchasing decision.

The photographic chemicals can also be treated to decrease their heavy metal contents . The printer is in possession of two silver recovery units. The silver recovery units were disconnected by the previous manager for unknown reasons. Use of the units would generate a small income from the recovered silver and would drastically reduce the silver concentration of the photographic wastes. Silver recovery units costing $600.00 are available in Anchorage from Oxford Asseying & Refining Inc. The dealer claims that these units have a two year payback period.

Plant Operations Changes & Plant Input Changes

The photographic chemicals should be chosen for their performance and their chemical properties. If the photographic chemicals contain, for example, heavy metals or trichloroethylene, they are likely to become hazardous wastes. The cost of waste disposal should be taken into consideration when comparing purchasing costs.

Water-based inks are also available. They do not require organic solvents when cleaning the presses and, if free of heavy metals, do not produce hazardous wastes. Water-based inks are usually cheaper than solvent-based inks and are similar in quality, gloss, and adhesion. Water-based inks require, however, a longer drying time than solvent-based inks.

Solvent used to clean the presses can be saved by good printing techniques. Printing should start with light color inks and end with darker ones. Doctor blades and squeegees should be used to remove as much ink as possible from the rollers prior to using solvent and rags. Non-toxic solvents should be used to clean the presses. If inks that contain hazardous pigments and solvents must be used, the wastes should be segregated.

Care should be taken, when ordering the various chemicals necessary for the printing processes, to choose non-hazardous chemicals if possible. Choosing non-hazardous chemicals and the segregation of wastes will greatly reduce the amount of hazardous wastes produced.

Good housekeeping can also greatly improve the efficiency of raw material use. Keeping lids and bungs on containers prevents loss of chemicals through evaporation. Training workers to use only what is needed and to handle materials properly decreases the raw materials used and the wastes generated.

In-Process Recycling

Reduction in photoprocessing chemicals use should also be studied. Most photoprocessing chemicals can be regenerated by making use of replenishers, thereby, decreasing the amounts of wastes produced. The low photographic waste figures, indicated for the printer in this audit, are due to an extensive use of replenishers/regenerators.

Excess ink used in the silk screen printing process is currently recaptured. The ink left on the silk screen is squeezed back into the can prior to washing the screen. This not only reduces the amount of ink used but also decreases the amount of cleaning emulsions needed to wash the screens.

VI. Summary & Conclusions

The printer in this audit was found to be generating less than 220 pounds of hazardous wastes per month. Generators of fewer than 220 pounds of hazardous per month are conditionally exempt from the Small Quantity Generator Regulations. Conditionally exempt generators, however, must identify the hazardous wastes they produce. In addition, the hazardous wastes accumulated on site cannot exceed 2,200 pounds. Storing more than 2,200 pounds of hazardous wastes on site will subject the conditionally exempt small quantity generator to the Small Quantity Generator Regulations. Currently, the printer may be storing in excess of 2,200 pounds of hazardous materials and may be subject to the Small Quantity Generator Regulations.

The quantity of hazardous wastes generated, by the printer described in this audit, was determined with information provided by the printer at the time of the audit. The printer may generate in excess of 220 pounds per month of hazardous wastes during the year if chemicals, other than the ones described in this audit, are used. Seasonal fluctuations in production volume and the quantity of hazardous wastes stored may also affect the printer's generator status.

In general, a printer should carefully monitor the chemicals used in the various processes and note the ingredients present in those chemicals. Periodical testing of the wastes should also be performed to identify the nature of the wastes produced.

The literature available and this audit point to the fact that many products which decrease the generation of hazardous wastes are available to printers. Material Safety and Data Sheets (MSDS) should be requested when ordering new products. The MSDS will identify the ingredients present in a particular product. This should greatly help in determining what hazardous wastes are likely to be generated if that product were to be used.

To minimize the generation of hazardous wastes, the printer should:

a) Choose raw materials not solely in terms of performance but also in terms of their hazardous properties as wastes.

b) Segregate wastes in order to minimize the amount of hazardous wastes produced.

c) Adopt production practices that will diminish the quantity of hazardous materials consumed and, therefore, the quantity of hazardous wastes produced.

d) Consider, when making capital investments, technologies that will reduce the amount of hazardous wastes generated.

e) Utilize the silver recovery units.

f) Provide training programs to workers to insure efficient use of raw materials.

g) Develop an inventory control to monitor the quantity and type of raw materials used.

Conducting periodic environmental audit can prove to be an excellent tool to decrease the hazardous wastes generated and to improve overall plant efficiency.

APPENDICES

Appendix A

Synopsis of the Small Quantity Generators Regulations

Facilities producing between 220 and 2200 pounds of hazardous wastes per month are subject to the Small Quantity Generator regulations. These regulations will require waste producing facility to:

1) Identify the hazardous wastes produced.

2) Obtain an EPA identification number.

3) Ship hazardous wastes for treatment, storage, or disposal in EPA approved facilities. The shipment will have to meet the requirements set by the Federal Department of Transportation for hazardous wastes. In addition the shipment will have to be accompanied by a manifest containing the generator's name and address, the shippers name, and the name and address of the receiving facility.

4) The hazardous wastes should be offered, at least every 180 days, to shippers and disposal facilities with an EPA identification number. In Alaska, because there are no EPA certified hazardous waste disposal sites within 200 miles, the wastes can be stored for 270 days. The maximum weight of the wastes being stored, however, cannot exceed 13,200 pounds.

5) Finally, the waste generator should keep a copy of the shipping manifest for three years.

APPENDIX B

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101

SEP 23 1986

REPLY TO ATTN OF M/S 530

RECEIVED
OCT 09 1986
WASTE MANAGEMENT BRANCH

David Wigglesworth
Alaska Health Project
417 W Eighth Avenue
Anchorage, Alaska 99501

Dear Mr. Wigglesworth:

This is in reply to your question regarding information required by the Alaska Health Project's small quantity generator study. The purpose of this project is to study general waste management procedures and processes for specific small quantity generator categories. We hope to identify common current waste practices that can be better managed, and/or methods where waste generation can be minimized.

Because we wish the study results and recomendations to be as widely applicable to other generators as possible, we would like to obtain information which characterizes the representative generators you are studying. We do not feel any facility-specific identifiers will be necessary, but we would like any information on the facility type, process, size of operation, and/or any other information which would have bearing on the usefulness or extrapolation of the data to other generators, both in and outside of Alaska.

If you have further questions, please feel free to contact me.

Sincerely,

Joan Cabreza
RCRA Program Development

Printing and Allied Industries

APPENDIX C

Your firm is included in Printing and Allied Industries if it is involved in:

Preparation

- Typesetting
- Lithography
- Letterpress
- Gravure
- Engraving (stationery)
- Photoengraving

Printing

- Heatset Lithography
- Non Heatset Lithography
  - Thermography
  - Business Form Printing
  - Sheetfed Lithography
- Letterpress Printing (including flexography)
- Gravure Printing
- Screen Press Printing

Finishing Operations

- Looseleaf Binder Manufacturers
- Trade Binding Operations
- Book Binding Operations
- In House Binding Operations
- Magazine and Catalog Binding Operations

Not all printing or allied industry operations produce hazardous waste. However, if you use ignitable (flash point ≤ 140°F) solvents, strong acid/alkaline solutions, paint or ink containing solvents or heavy metals (in concentrations greater than the EP Toxicity levels) or both, the wastes you generate may be hazardous. If so, you may be subject to new Resource Conservation and Recovery Act (RCRA) provisions concerning the generation and transportation of hazardous wastes. Table 1 lists typical processes/operations in the printing and allied industries which could produce hazardous wastes.

HAZARDOUS WASTES FROM PRINTING AND ALLIED INDUSTRIES

Printing generates waste ink and ink sludges that may contain solvents and sometimes heavy metals. The composition of inks used in printing and allied industries varies greatly depending on whether an ink is to be used for lithography, letterpress, gravure, flexography, or screen printing. Oil-based or paste inks are generally composed of colorant or pigments (carbon black, inorganic, and organic), varnish (drying oils, alkyd, resin-phenolic, resin-ester), drier (cobalt, manganese, or zirconium fatty acid compounds), sometimes an extender, solvents and modifiers (waxes, petroleum solvents, and magnesia). Fluid inks contain a vehicle comprised of resin and solvent or oil and additives such as waxes, drier and wetting agents. While not all waste inks and ink sludges will be hazardous, those containing solvents or heavy metals generally are.

Photographic processes are used in all of the major printing operations for image conversion and plate-making. Photographic wastes, therefore, comprise a large portion of the hazardous waste generated in these industries. Photographic processing solutions, developers, hardeners, plating chemicals, fountain solutions, or fixing baths that are sent to publicly-owned treatment works (POTWS) for disposal, however, are exempt from new (RCRA) requirements. Silver-containing solutions that pass through electrolytic, chemical replacement, or ion exchange silver recovery units located on your premises are similarly exempt. However, if you send your wastes off-site for recycling (i.e., silver recovery or solvent recovery) the wastes must be accompanied by a Manifest.

If your business produces 220 pounds or more of hazardous waste per month, you are required to use a Uniform Hazardous Waste Manifest when you ship such wastes off your premises. Item 11 on the Manifest requires the Department of Transportation (DOT) shipping description: the proper DOT shipping name, hazard class, and UN/NA identification number. This information is provided in Table 2. If you do not find your waste listed here, but suspect it may be hazardous, please contact your state hazardous waste management agency for additional assistance.

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See Tables 1 and 2 inside

Table 1

HAZARDOUS WASTES GENERATED BY VARIOUS PRINTING OPERATIONS

TYPICAL PROCESS/ OPERATION	TYPICAL MATERIALS USED	TYPICAL MATERIAL INGREDIENTS	GENERAL WASTE TYPES
LATE PREPARATION			
*Counter-etch to remove oxide	Phosphoric acid	Phosphoric acid	Acid/alkaline waste
*Deep-etch coating of plates	Deep etch bath	Ammonium dichromate, ammonium hydroxide	Acid/alkaline waste, heavy metals, waste etch bath
*Etch baths	Multimetal plate and plate coating	Ferric chloride (copper), aluminum/zinc chloride/hydrochloric acid (chromium), nitric acid (zinc, magnesium), gum arabic	Waste etch bath, acid/alkaline waste, heavy metal wastes
Apply light sensitive coating	Resins, binders, emulsion, photosensitizers, gelatin, photoinitiators	PVA/ammonium dichromate, polyvinyl cinnamate, fish glue/albumin, silver halide/gelatin emulsion, gum arabic/ammonium dichromate	Photographic waste
Develop plates	Developer	Lactic acid, zinc chloride, magnesium chloride, hydroquinone	Photographic waste
Wash/clean plates, type, die, press blankets and rollers	Alcohols, solvents	Ethyl alcohol, benzene, toluene, xylene, isopropyl alcohol, methyl ethyl ketone, trichloroethylene, perchloroethylene, carbon tetrachloride, gasoline, naphtha, kerosene	Spent solvents
*Apply lacquer	Resins, solvents, vinyl lacquer, lacquer developers	PVC, PVA, maleic acid, methyl ethyl ketone, cyclohexanone, isophorone	Spent solvents
Using Ink (lithography, letterpress, screen printing, flexography)	Pigments, dyes, varnish, driers, extender, modifier, fountain solutions	Titanium oxide, iron blues, molybdated chrome orange, phthalocyanine pigments, oils, hydrocarbon solvents, waxes, cobalt/zinc/manganese oleates, plasticizers, barium-based pigments	Waste ink with solvents/chromium/lead/barium, ink sludges with chromium/lead/barium
Making gravure cylinders	Acid plating bath	Copper, chromic acid, chrome	Spent plating waste
STENCIL PREPARATION FOR SCREEN PRINTING			
Lacquer stencil film	Solvents, polyester film, vinyl film, dyes	Aliphatic acetates, cellulose-based lacquer, plasticizers	Spent solvents
Photographic stencil film	Organic acids, gelatin (pigmented), polyester film base	Acids, alkalis, peroxide-forming compounds, plasticizers, surfactants	Hydrogen peroxide
Photoemulsion	Resins, binders, photosensitizers, dyes	PVA, PVAC, ammonium or potassium bichromate, diazonium compounds	Photographic waste
Blockout (screen filler)	Pigmented polymers, solvents, acetates	Methylene chloride, methanol, methyl cellulose acetates	Spent solvents

*Older technologies

Table 2 notes:

These descriptions may change given variations in waste characteristics and conditions.
Trade names will differ among manufacturers. Check Material Safety Data Sheets for the presence of the following chemicals.
The difference between the combustible and flammable liquid hazard class designations is based on the flash point of the material (flammable <100°F, combustible 100-200°F). The flash point will depend in large part on the solvents in the waste.
NOS Otherwise Specified.

Table 2

WASTE DESCRIPTIONS[1]				
WASTE TYPE	**DESIGNATION/ TRADE NAMES[2]**	**DOT SHIPPING NAME**	**HAZARD CLASS**	**UN/NA ID NUMBER**
PHOTOGRAPHIC WASTES				
Heavy Metal Solutions	Photographic processing waste containing heavy metals	Hazardous Waste Solution containing Cadmium, Chromium, Lead, and/or Cyanide	ORM-E	NA9189
Trichloroethylene	Trichloroethylene, Trichloroethene, Ethinyl trichloride, TriClene, Trielene, Tri	Waste Trichloroethylene	ORM-A	UN1710
SPENT SOLVENTS				
Carbon Tetrachloride	Carbon tetrachloride, Perchloromethane, Necatorina, Benzinoform, CCl_4	Waste Carbon Tetrachloride	ORM-A	UN1846
Ethanol	Ethanol, Ethyl alcohol	Waste Ethyl Alcohol	Flammable Liquid	UN1170
Isopropanol	Isopropanol, Isopropyl alcohol	Waste Isopropanol	Flammable Liquid	UN1219
Ethyl Benzene	Ethyl benzene	Waste Ethyl Benzene	Flammable Liquid	UN1175
1,1,1-Trichloroethane	1,1,1-Trichloroethane, Aerothane TT, Chlorten, Inhibisol, Trichloroethane, Chloroethen NU, NCI-C04626, Methylchloroform, Chlorothene VG, Chloroethane NU, Chlorotene	Waste 1,1,1-Trichloroethane	ORM-A	UN2831
Methylene Chloride	Dichloromethane, Methane dichloride, Methylene bichloride, NCI-CS0102, Methylene dichloride, Solaesthin, Aerothene NM, Narkotil, Solmethine	Waste Dichloromethane or Methylene Chloride	ORM-A	UN1593
WASTE INK WITH SOLVENTS OR HEAVY METALS				
Waste Ink	Various Constituent Solvents: Carbon tetrachloride, Chloroform, Methylene chloride, 1,1,1-Trichloroethane, 1,2-Dichloroethane, Benzene, Toluene, Ethyl benzene, Tetrachloroethylene, Trichloroethylene Various Constituents from Pigments: Chromium, Copper, Lead, Zinc, Cyanide, Aluminum, Cadmium, Nickel, Cobalt	Waste Ink	Combustible Liquid[3] Flammable Liquid	UN2367 UN1210
STRONG ACID/ALKALINE WASTES				
Ammonium hydroxide	Ammonium hydroxide, Aqua Ammonia, Spirit of Hartshorn, NH_4OH	Waste Ammonium Hydroxide (containing not less than 12% but not more than 44% ammonia)	Corrosive Material	NA2672
		(containing less than 12% ammonia)	ORM-A	NA2672
Hydrochloric Acid	Hydrochloric acid, Muriatic acid, HCl	Waste Hydrochloric Acid Mixture	Corrosive Material	NA1789
Nitric Acid	Nitric acid, Aquaforte, HNO_3	Waste Nitric Acid (over 40%)	Oxidizer	UN2031
		(40% or less)	Corrosive Material	NA1760
Phosphoric Acid	Phosphoric acid, Orthophosphoric acid, H_3PO_4	Waste Phosphoric Acid	Corrosive Material	UN1805
Sodium Hydroxide	Sodium hydroxide, Caustic Soda, Soda Lye, Sodium hydrate, NaOH	Waste Sodium Hydroxide Solution	Corrosive Material	UN1824
		Dry Solid, Flake, Bead, or Granular	Corrosive Material	UN1823
Sulfuric Acid	Sulfuric acid, Oil of Vitriol, H_2SO_4	Waste Sulfuric Acid, Spent	Corrosive Material	UN1832
Chromic Acid	Chromic acid	Waste Chromic Acid Solution	Corrosive Material	UN1755
SPENT PLATING WASTES				
Spent Plating Wastes	Spent etch baths, spent plating solutions and sludges, stripping and cleaning baths	Hazardous Waste, Liquid or Solid, NOS[4]	ORM-E	NA9189
INK SLUDGE WITH CHROMIUM OR LEAD				
Ink sludge with Chromium or Lead	Ink sludge containing heavy metals	Hazardous Waste, Liquid or Solid, NOS	ORM-E	NA9189
IGNITABLE WASTES NOS				
Ignitable Wastes NOS	Ignitable Wastes NOS	Waste Flammable Liquid, NOS	Flammable Liquid	UN1993
		Waste Combustible Liquid, NOS	Combustible Liquid	UN1993
		Waste Flammable Solid, NOS	Flammable Solid	UN1325

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